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Fatigue Life Estimation and Dynamic Analysis of Chain Spocket

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Abstract: **Roller bond or bush cylinder enslave is one of the type of chain drive mostly employment for transmission of mechanical power on many kinds of chambermaid, industrial, agricultural machineries, as well as includes conveyor and tube drawing machines, printing presses, railcar, motorcycles, and bicycles etc. Chain drive insist of a series of scanty round rollers held to get herby side links a Chain force is driven by a dentate wheel called a sprocket. The sprocket is a very essential part in the transmission of government and motion in most motorcycles. Generally sprockets are made of tranquil steel. In this Thesis, existing sprocket motorcycle is liken with the toot of carbon fiber and e glass fiber significant. The drawing and drafting is done using CREO software. Further FEA software are used for analysis of sprocket chain. With different properties of mild steel E glass and carbon vulcanized fiber, press and deformation of sprocket is vie. This work will be valuable for further unfolding of sprockets fasten. 3d modelling done in CREO, analysis is done in ANSYS.**

Key words: **Chain Spoket; CREO;FEM**

I. INTRODUCTION

Chain drive is a way of transmitting mechanical dominion from one place to another. It is often used to communicate power to the wheels of a vahan, particularly bicycles and motorcycles. It is also utility in a remote variety of dress besides vehicles. Most often, the sway is thieve by a bandage bond, known as the ride chain or transmission chain, passing over a sprocket clothing, with the enforceability of the gear meshing with the aperture in the grounds of the chain. The gear is turned, and this pulls the chain putting mechanic force into the system. Another type of excavation enslave is the Morse fasten, invented by the Morse Chain Company of Ithaca, New York, United States. This has reversed teeth. Sometimes the sway is output by simply rotating the bind, which can be utility to lift or drag objects. In other situations, a secondary manner is placed and the power is recovered by attaching shafts or hubs to this trapping [1]. Though conduct irons are often single oval loops, they can also go around quarter by placing more than two custom along the chain; gears that do not put dominion into the system or transmit it out are generally given as idler-orb. By varying the module of the input and production garments with revere to each other, the gear rate can be varying. For precedent, when the bicycle pedals' garments wheel-shaped once, it causes the property that drives the revolve to rotate more than one revolution

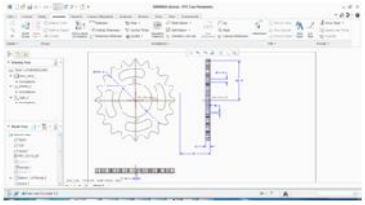
Motorcycles: Chain force versus girth force or use of a driveshaft is a fundamental design decision in motorcycle designate; nearly all motorcycles use one of these three intend. See Motorcycle structure § Final drive for more details [6][7].

II. LITERATURE REVIEW

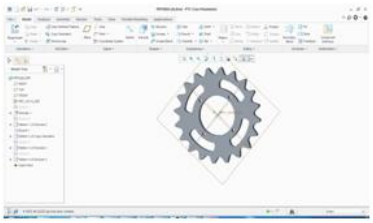
Ebhota Williams S, et al., "Fundamentals of Sprocket Design and Reverse Engineering of Rear Sprocket of a Yamaha CY80 Motorcycle". In this research paper, study involves the fundamentals of sprocket intend and manufacturing of a soon sprocket of Yamaha CY80 bike through reverse engineering approach. The eight erect that are to be followed sequentially in the reversal engineering approach are scatter. They manufactured the sprocket by universal milling machine from the blanked tranquil carbon steel (AISI 1045) with chemical combination of C=0.45%, Mn=0.75%, P=0.03% max, S=0.04%. Then International Engineering Research Journal Page No 218-225 induction heat management was referred to move the material austerity from 13 HRC to 45 HRC. Swapnil Ghodake, Prashant Deshpande, Shrikant Phadatare "Optimization of Excavator Sprocket and it's Validation by Test Rig Concept" [4]. In this newspaper, sprocket efficacy optimization is done with reducing material to get hone sketch which can affect well under twist predicament charge same constraints. For this purpose, an FEM tool is used for analysing existing and optimized sprocket with different types of FEA techniques. Strain Gauging is done or correlation with FEA virtual force to settle the loadings. Conceptual Test pilfer is design to validate the optimized sprocket. Chandraraj Singh Baghel, Abhishek Jain [8], Dr. A.K. Nema and Anil Mahapatra "Software ANSYS Based Analysis on Replacement of Material of Sprocket Metal to Plastic Material PEEK". In this study of the stress of chain, sprocket of motorcycle is compared with the sprocket of plastic material made by PEEK (polyether ether ketone). Chaitanya G Rothe, A.S.Bombatkar, "Design and Analysis of

Composite Material Drive Shaft". In this work deals with the replacement of conventional steel drive pit with high strength carbon/epoxy decompound drive shaft. The design parameters were optimized with the prevent of genetic algorithmic rule (GA) with the objective of belittle the weight of composite drive shaft [9]. The terminate of GA are usage for example of carbon/epoxy composite drive shaft and steel drive shaft using CAD software to accomplish stable, buckling and modal analysis of both drive pit worn ANSYS. No researcher have address effort for designing of sprocket with carbon fiber. Therefore, there is gloomy need to work on sprocket with composite corporeal. In this work, we present the carbon fiber as substitute for correct mild harden [10]. Also, we done the CAD through reverse engineering and analysis is carried out using Hyper mesh and ANSYS..

MODELLING



2D MODEL OF CHAIN SPROCKET



3D MODEL OF CHAIN SPROCKET

STATIC ANALYSIS OF CHAIN SPROCKET

Materials – steel

Young's modulus	=	205000mpa
Poisson's ratio	=	0.30
Density	=	7850 kg/mm3

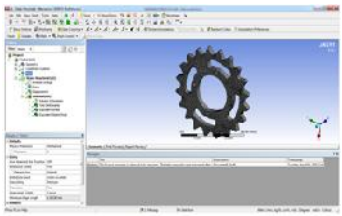
Save CREO Model as. Iges format

→ → Ansys → Workbench → Select evaluation device → static structural → double click on

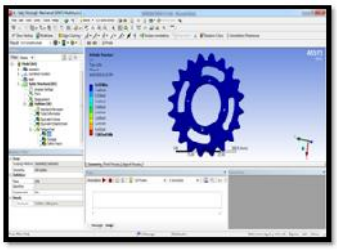
→ → Select geometry → proper click on → import geometry → pick out browse → open element → good enough

→ → Select mesh on work bench → proper click on → edit

Double click on geometry → choose MSBR → edit cloth → Select mesh on left side part tree → right click → generate mesh →

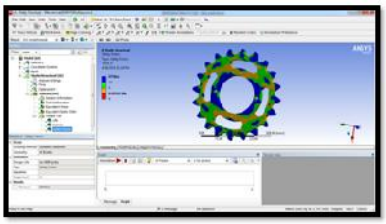


FATIGUE ANALYSIS OF CHAIN SPROCKET



Life

Damage

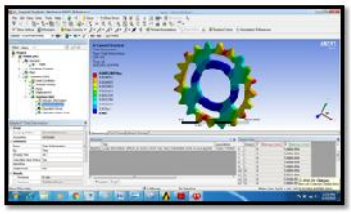


Safety Factor

DYNAMIC ANALYSIS OF CHIAN SPROCKET

MATERIAL - STEEL

TOTAL DEFORMATION



TIME-10 SEC

TIME-20 SEC

TIME-30 SEC

RESULTS:

STATIC ANALYSIS RESULTS

MATERIAL	DEFORMATION	STRESS (N/mm2)	STRAIN
STEEL	0.00064154	1.5205	7.63E-06
CARBON FIBER	0.0016802	1.3938	1.99E-05
E GLASS FIBER	0.00016238	1.3913	1.94E-05

FATIGUE ANALYSIS RESULTS

MATERIAL	LIFE	DAMAGE	SAFETY FACTOR
STEEL	1.00E+10	1.427	0.90762
CARBON FIBER	1.00E+10	1.0371	0.99063
E GLASS FIBER	1.00E+10	1.302	0.99191

TRANSIENT ANALYSIS RESULTS

Material	Time	Deformation	Stress	Strain
Steel	10	0.00052489	1.349	6.77E-06
	20	0.00057738	1.4839	7.45E-06
	30	0.00062987	1.6188	8.13E-06
Carbon fiber	10	0.011998	1.0792	1.54E-05
	20	0.0013497	1.2141	1.74E-05
	30	0.0014997	1.349	1.94E-05
E glass fiber	10	0.0010498	0.9443	1.35E-05
	20	0.0011998	1.0792	1.55E-05
	30	0.001342	1.1941	1.74E-05

III. CONCLUSION

From effect of finite constitute analysis it is observed that force is maximum at junction locations. It is also observed that the three materials (steel, carbon fibre and E mirror fiber) have force values less than their respective dispensable permit stress values. Hence the design is safe. From analysis results and comparison of properties of all the materials, it is found that carbon fiber is the physical which is possession the least density; also it is gracefully available and cheap as get to other vary materials. Also machining rib for carbon fiber is less. Hence it is the prime pursuit substitute momentous for sprocket and is expected to accomplish better with satiate amount of efficacy reduction

IV. REFERENCES

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